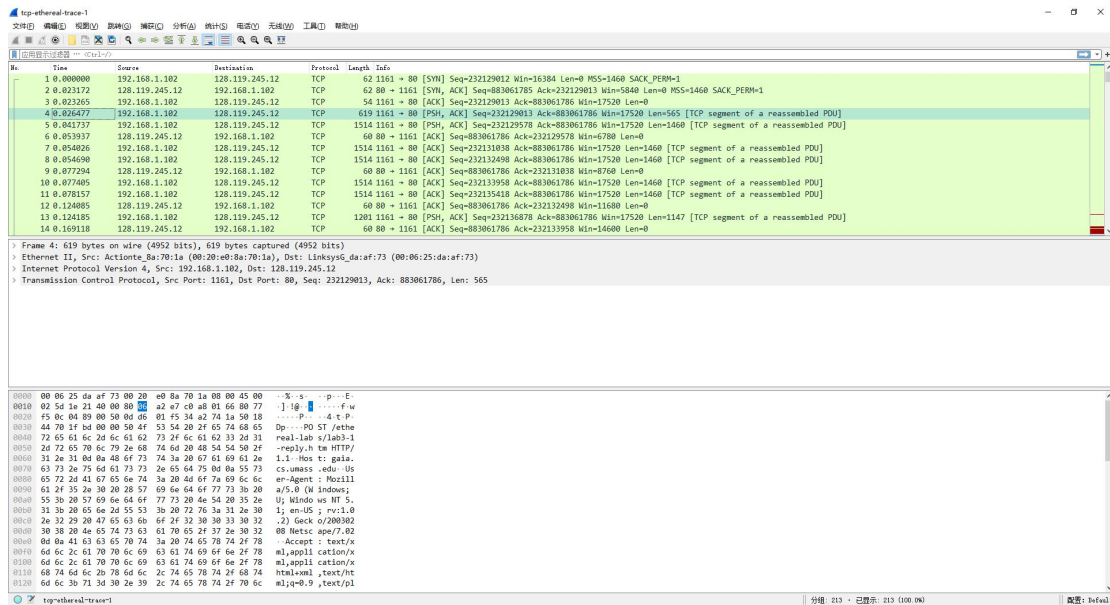# Exercise 1: Understanding TCP using Wireshark

z5290005 LongHao

Question 1

IP address of gaia.cs.umass.edu: 128.119.245.12

Port number of gaia.cs.umass.edu: 80

IP address of client computer: 192.168.1.102

Port number of client computer: 1161

Question 2

Sequence number: 232129013

Question 3

segment number	sequence number	sent time	receive ACK time	RTT	EstimatedRTT
segment 1	232129013	0.026477	0.053937	0.027460	0.027460
segment 2	232129578	0.041737	0.077294	0.035557	0.028472
segment 3	232131038	0.054026	0.124085	0.070059	0.033670
segment 4	232132498	0.054690	0.169118	0.114428	0.043765
segment 5	232133958	0.077405	0.217299	0.139894	0.055781
segment 6	232135418	0.078157	0.267802	0.189645	0.072514

Question 4

segment number	segment length(bytes)
segment 1	565
segment 2	1460
segment 3	1460
segment 4	1460
segment 5	1460
segment 6	1460

Question 5
Window size buffer: 5840
No, the lack of receiver buffer space does not throttle the sender.

Question 6
No there is not any retransmitted segment.
When checking the sequence number, if there is a retransmitted segment, the sequence number of this segment would lower than the segment sequence number before.

Question 7
The number of sequence number plus the length of the segment can be the number of ACK number. So the ACK receiver acknowledge the length of the data in an ACK. And the gap between the ACK sequence number is the length of data. Like the ACK of segment 2 is 232131038 and the ACK of segment 3 is 232132498, the difference is the length of data 1460.

Question 8
The first segment:

`4 0.026477     192.168.1.102      128.119.245.12      TCP      619 1161 → 80 [PSH, ACK] Seq=232129013 Ack=883061786 Win=17520 Len=565 [TCP segment of a reassembled PDU]`

The last segment:

`202 5.455830     128.119.245.12      192.168.1.102      TCP      60 80 → 1161 [ACK] Seq=883061786 Ack=232293103 Win=62780 Len=0`

Data: 232293103 - 232129013 = 164090
Time: 5.45583 - 0.026577 = 5.429253
Through put: Data / Time = 16490 / 5.429253 = 30223 bps

Exercise 2: TCP Connection Management

Question 1

The sequence number is 2818463618

Question 2

The sequence number of SYNACK is 1247095790.

The value of the acknowledgement is 1.

The length of SYN segment is 1.

And the number of ACK of 296 - the number of sequence of 295 = 1

Question 3

The sequence number is 2818463619.

The ACK number is 1257095791.

No, because the next segment use the same sequence number.

Question 4

They both have done the active close.

The sequence number sent by the client is same as the ACK number sent by the server but Fin counts 1 byte.

It is a simultaneous close.

Question 5

Client to server:

The initial sequence number is 2818463618 and the last ACK number is 2818463653.

Data = 2818463653(last ACK number) - 2818463618(first sequence number) - 1(SYN) - 1(FIN) = 33

Server to client:

The initial sequence number is 1247095790 and the last ACK number is 1257095832.

Data = 1247095832(last ACK number) - 1247095790(first sequence number) -1(SYN) -1(FIN) = 40